भारतीय मानक
Indian Standard

IS 16909 : 2018

गर्थ गियर लुब्रिकेंट्स — विशिष्टि

Girth Gear Lubricants — Specification

ICS 75.100

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Lubricants and Their Related Products Sectional Committee, PCD 25

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards after the draft finalized by the Lubricants and Their Related Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

The right lubricant is vital for reliable operation of ball mills, rotary kilns etc, installed in cement plants, steel plants, mining and other industries. The purpose of this standard is to provide requirements and methods of sampling and test for lubricants used for lubrication of heavy duty open girth gears in all types of ball mills, rotary kilns in order to ensure optimum lubrication to prevent damage.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

GIRTH GEAR LUBRICANTS — SPECIFICATION

1 SCOPE

This standard prescribes the requirements and methods of sampling and test for priming, running in and operational lubricants used for lubrication of heavy duty open girth gears and double pinion gear assemblies in all types of ball mills, rotary kilns etc. in cement plants, steel plants, mining and other industries.

2 REFERENCES

The following standards contain provisions which through reference in this text, constitute provisions of the standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below

IS No.	*Title*
1447 (Part 3) : 1992	Petroleum and its products — Methods of sampling: Part 3 Method of sampling of semi-solid and solid petroleum products (*first revision*)
1448	Methods of test for petroleum and its products
[P : 25] : 1976	Determination of kinematic and dynamic viscosity (*first revision*)
[P : 25/Sec 1] : 2018 /ISO 3104 : 1994	Transparent and opaque liquids, Section 1 Determination of kinematic viscosity and calculation of dynamic viscosity (*second revision*)
[P : 51] : 1963	Copper strip corrosion test for lubricating greases
[P : 52] : 2017 /ISO 2176 : 1995	Drop point (*second revision*)
[P : 56] : 2013 /ISO 2909 : 2002	Viscosity index by calculation (*second revision*)
[P : 58] : 1991	Determination of insolubles in greases (*first revision*)
[P : 59] : 1991	Determination of mineral oil content in greases (*second revision*)
[P : 60] : 1994	Consistency of lubricating greases by cone penetrometer (*second revision*)
[P : 69] : 2013 /ISO 2592 : 2002	Flash and fire point by cleveland (open) cup method

3 GRADES

The material shall be of the following three grades:

a) Priming lubricant,

b) Running in lubricant, and

c) Operational or Regular lubricants with different base oil viscosities.

4 REQUIREMENTS

4.1 General Requirements

The girth gear lubricants used for open girth gears in cement plants and other industries shall be smooth, dark, homogeneous, uniform in consistency, free from grit, abrasive matter, water, chlorides or other visible impurities and shall also be free from any objectionable odour. The material shall not show any sign of break down, hardening or tendency of the constituents to separate and shall possess good sprayability and pumpability characteristics.

4.2 Composition

The material shall be prepared from the following ingredients in such proportion as to comply with the requirements prescribed in Table 2.

4.2.1 *Mineral Lubricating Oil*

The mineral oil extracted from the grease by method ‘A’ prescribed in IS 1448 [P : 59] and complying with the requirements given in Table 1.

Table 1 Requirements for Mineral Lubricating Oil

(*Clause* 4.2.1)

Sl No.	Characteristics	Requirements					Method of Test Ref to [P:] of IS 1448
		Priming lubricant	Running in lubricant	Regular lubricants			
		VG 500	VG 500	VG 500	VG 1000	VG 2500	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Kinematic viscosity[1] in cSt at 40ºC, *Min*	500	500	500	1000	2500	P: 25
ii)	Viscosity Index (VI), *Min*	80	80	80	80	80	P:56
iii)	Flash point, ºC, *Min*	220	220	220	220	220	P: 69

[1] As agreed to between the purchaser and the supplier.

4.2.2 *Thickeners*

Aluminum complex and or any compatible thickener.

4.2.3 *Solid Lubricants*

Five to fifteen percent by mass with particle size not more than 6 microns.

4.2.4 *Additives*

Extreme pressure / antiwear, as desired.

4.3 The material shall also comply with the requirements prescribed in Table 2 when tested according to the methods given in col 8 and 9 of Table 2.

4.4 Sprayability

Since the girth gear lubricants are being sprayed through automatic grease spraying systems, the lubricant must have excellent sprayability pattern so that it can be easily sprayed even below ambient temperature. Typical spraybility pattern of regular lubricant (ISO-VG 500 grade) is given in Fig 1.

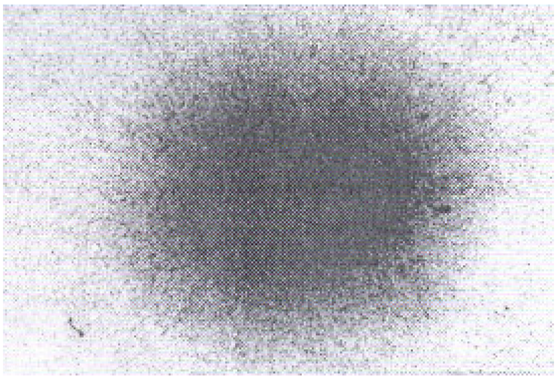

FIG. 1 TYPICAL SPRAYABILITY PATTERN OF REGULAR LUBRICANT (VG-500)

4.5 Keeping Quality (Shelf Life)

The keeping quality of the material shall be such that when stored in original sealed containers, kept in upright position, under normal conditions, it shall retain the properties given in the specification for not less than one year from the date of manufacture of the product.

5 PACKING AND MARKING

5.1 Packing

The material shall be packed in suitable, clean, dry, leak proof containers free from rust and dirt, as agreed to between the purchaser and the supplier.

5.2 Marking

5.2.1 The containers shall be securely closed and marked with the followings:

a) Indication of the source of manufacture;
b) Name, type and grade of the material;
c) Net mass of the material;
d) Date of manufacture;
e) Recognized trade-mark, if any; and
f) Identification in code or otherwise to enable the lot of consignment or manufacture to be traced back.

5.2.2 *BIS Certification Marking*

The container may also be marked with the Standard Mark.

5.2.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations made thereunder. The details of the conditions under which the licence for use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

6 SAMPLING

6.1 Representative samples of the material shall be drawn as prescribed in IS 1447 (Part 3).

6.2 Criteria for Conformity

Individual containers selected according to IS 1447 (Part 3) shall be opened and examined for the general requirements given in **4.1**. Tests for consistency, drop point and copper strip corrosion shall be done on individual samples and other tests on composite sample. The lot shall be declared satisfactory only if all individual and composite samples pass the prescribed tests.

Table 2 Requirements for Girth Gear Lubricants

(*Clauses* 4.2 and 4.3)

Sl No.	**Characteristics**	**Requirements**					**Method of Test, Ref to**	
		Priming lubricant	Running in lubricant	Regular lubricants			**Annex**	**[P:] of IS 1448**
		VG 500	VG 500	VG 500	VG 1000	VG 2500		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	Consistency of the worked material at 25± 0.5°C	310-340	400-430	380-420	400-430	400-430		P : 60
ii)	Drop point, °C, *Min*	180	180	180	180	180		P :52
iii)	Copper strip corrosion test, at 100°C for 24h	Negative	Negative	Negative	Negative	Negative		P : 51
iv)	Graphite flake content, percent by mass	5.0-10.0	5.0-15.0	5.0-15.0	5.0-15.0	5.0-15.0		P : 58
v)	Particle size of graphite, microns, *Max*	6.0	6.0	6.0	6.0	6.0		P[1] (conforms to IS 495 with particle size)
vi)	Resistance to water	No emulsion is formed with cold or hot water	No emulsion is formed with cold or hot water	No emulsion is formed with cold or hot water	No emulsion is formed with cold or hot water	No emulsion is formed with cold or hot water	A	
vii)	Timken OK load, kg, *Min*	18	18	18	18	18		P : [2]
viii)	Wear Scar Dia, mm, *Max*	0.60	0.60	0.60	0.60	0.60		P : [3]
ix)	Four ball weld load, kg, *Min*	500	700	700	620	620		P : [4]
x)	Sprayability	–	Sprayable	Sprayable	Sprayable	Sprayable	B	
xi)	FZG wear test,							DIN 52354 (M)
	a) pass Stage, *Min*	–	12th	12th	12th	12th		
	b)Wt loss, mg, *Max*	–	0.2	0.2	0.2	0.2		

[1] Laser malvern technique (average particle size distribution).

[2] Under preparation till such time ASTM D-2509 may be followed.

[3] Under preparation till such time ASTM D-2266 may be followed.

[4] Under preparation till such time IP 239 may be followed.

ANNEX A

[*Table* 2, *Sl No.* (vi)]

TEST FOR RESISTANCE TO WATER

A-1 PROCEDURE

A-1.1 Take a sample of approximately 5 g of grease in a 150 mm long × 25 mm ID test tube. Fill the test tube to half with cold distilled water and hold for half an hour with manual agitation after every 5 min. After half an hour, examine the grease for the formation of any emulsion with cold water.

A-1.2 Heat the test tube and its contents slowly over bunsen burner to near boiling point without agitation and again examine the condition of the grease for any emulsion formation with hot water.

A-1.3 The grease shall be regarded to have passed the test, if no emulsion is formed with either cold or hot water.

ANNEX B

[*Table* 2, *Sl No.* (x)]

SPRAYABILITY TEST

B-1 TEST CONDITIONS AND TEST REPORT

B-1.1 Spraybility Tester

B-1.1.1 *Spray Nozzle* — Wide angle spray nozzle with control valve.

B-1.1.2 *Air Consumption* — Shall be 30 l/min at 5 bar to 40 l/min at 6 bar.

B-1.1.3 *Size of Spray Pattern* (distance of spray nozzle 200 mm) — 170 mm × 80 mm

B-1.1.4 *Sprayed Quantity* — 3 cm^3

B-1.2 Spray Pattern (at 20°C)

B-1.2.1 *Quality Factor of Spray Pattern K*:

a = good lubricant repartition;
b = mean repartition;
c = bad repartition; and
d = light product (sprayable only with special spray unit and special spray nozzle).

B-1.3 Spraying Ability (in a spray unit):

With quality factor K = **c** — not suitable, **b** — limited suitable, and **a** — suitable.

B-1.4 Report

The lubricant is well sprayable or non-sprayable at 20°C.

Bureau of Indian Standards

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